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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/594,905	06/15/2000	Emilio Rodriguez Cabeo	A33169 PCT USA	9388

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EXAMINER	
PADGETT, MARIANNE L	
ART UNIT	PAPER NUMBER
1762	12

DATE MAILED: 07/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/594,285	Applicant(s) Cabeo et al
	Examiner M.L. Padgett	Group Art Unit 1762

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

☒ Responsive to communication(s) filed on 5/15/03.

☐ This action is FINAL.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

☒ Claim(s) 1-4, 8-13, 15-29 + 40 is/are pending in the application.

Of the above claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 1-4, 8-13, 15-29 + 40 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claim(s) _____ are subject to restriction or election requirement

Application Papers

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119 (a)-(d).

☐ All ☐ Some* ☐ None of the:

☐ Certified copies of the priority documents have been received.

☐ Certified copies of the priority documents have been received in Application No. _____.

☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a))

*Certified copies not received: _____.

Attachment(s)

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☒ Interview Summary, PTO-413 paper #10

☐ Notice of Reference(s) Cited, PTO-892

☐ Notice of Informal Patent Application, PTO-152

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Other _____

Office Action Summary

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/15/03 has been entered.

2. New claim 40 has an obvious spelling error in the last line, "the fist value", hence applicants may wish to correct "fist" to read --first--. Present management policy in section 1700 prohibits examiners from rejecting, such errors, but correction for the sake of clarity is recommended by the examiner.

3. In the independent claims, "a relation of...excited boron...product to another...product" is still considered to be so broad as to read on almost any concept that may be attributed to a gas in a plasma, i.e., distribution, charge, amount, etc. Note that this includes how evenly a gas product is distributed in the treatment chambers or plasma envelope, regardless of its actual concentration. This is not a relation that would be expected to be effected by most production parameters, or to change significantly during processing, so would be read on inherently by almost any selected parameter, but it is included by applicants all inclusive or very broad scope.

4. Applicant's definition of "hPa" as "hectoPascals" is noted, however to be formally accepted on the record, applicant should have supplied a print out from the website(s), since websites change and are not necessarily accessible. The examiner has supplied a dictionary definition showing that "hecto-" is symbolized by "h", and stands for "one hundred times that unit" (not hundreds), so 1 hPa would be 10^2 Pa. Therefore, claim 22 reads on 50-1,500 Pa and 1 to about 10 hPa in claim 23 reads on 10^2 to about 10^3 Pa.

5. As previously noted, in claim 4, there is absolutely not any positive requirement that any halogen be employed anywhere or at time in the process, hence claim 4 will read on any process of claim 1 that increases temperature any time during processing. Since there is no halogenide formation that can take place, any temperature selected will read on claims 4's "selected treatment temperature" under such halogen free conditions. For this claim to be meaningful, context in the claim providing for the positive presence of halogens in the process might be considered.

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1-4, 8-13, 15-29 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hunger et al (Canadian) as discussed in Paper No. 7, section 3, and Paper No. 5, sections 3-4, in view of Walther optionally for claims 1-4,8-11,13,15-29 & 40, required for 12 (discussed in section 6 of Paper No. 7 or section 10 of No. 5).

With respect to the supplied definition in claims 22-23, Hunger et al's taught 1-10 mbar pressures correspond to 0.1-1 kPa, therefore to 10^2-10^3 Pa or 1-10 hPa, which reads exactly on claimed values.

Claim 27 has been amended to positively require Ar volumes. As noted previously, the abstract and page 3 of Hunger et al, optionally teach use of Ar with their mixture of boron source gas (BF_3 preferred and 5-20% by volume, with 5-15% by volume preferred), plus H_2 (20-90% by volume, with 20-50% by volume preferred), but do not teach any specific values for their optionally taught argon. It would have been obvious to one of ordinary skill in the art to determine such values for the suggested Ar by routine experimentation, using the taught and preferred values of required gases to as a starting point for determining argon on volumes, i.e. 5% B + 20% H_2 leaves 75% for Ar; or (20% or 15%) B + 50% H_2, leaves 30% or 35% by volume Ar. The maximum use of H_2 still corresponds to zero to 5% volume left for Ar. These values are consistent and read on applicants' amended claim 27. Page 4 is noted to teach that use of Ar enables activity of B transfer to be controlled and sufficient heating of the specimens (substrates) by the plasma to be achieved.

With respect to the "determining..." and "selecting..." limitations as now amended to require the selection of parameters to now consider/use the determined amount of some excited B-gas product in the plasma in some unspecified way, in order that either a minimum or maximum (includes 0 to infinity) of that excited product be maintained, some relationship (see discussion in section 3 above) also with bounds that could be any where from zero to ∞, between the excited B-product and any gaseous component in the glow discharge be, maintained (all may be considered products, because the gas therein, neutral charged, radical fragments, etc., are in dynamic relationships with each other). As noted previously, Hunger et al teach controlling and maintaining operating parameters, specifically page 5, line 14-19 recite

"...the system for controlling and monitoring the operating parameters: the latter system controls and monitors the course of the process". While this broad statement does not say how this is done, it is inclusive of monitoring and controlling the state of the plasma gas and/or the deposit. The phrasing implies an ongoing monitoring and control procedures, i.e., occurs more than once or is continuous. It would therefore have been obvious to one of ordinary skill in the art to monitor either a key reactant gas critical to the deposition, as described by the plasma transfer reactions Hunger et al illustrates on page 4, or the deposit itself. As Hunger et al is concerned with how the existed gas mixture enables transfer of the B to the substrate, this would suggest to one of ordinary skill what the appropriate characteristic of the plasma process would have been appropriate to monitor in order to control it, by then adjusting the parameters that affect the critical monitored species. Hunger et al's process is maintaining the gas to cause deposition, thus must have a minimum of species enabling transfer, or it would not be occurring. Such a process would appear to be a subject of the broad possibilities of applicant's claims. Alternately, control processes of Hunger et al, are unlikely to disrupt or change the "relation" of the overall gas distribution if they do not change the size of the plasma enveloped, which would have been expected to be maintained at a volume which enable deposition on the desired surface, hence would also read on claimed maintaining.

Optionally, given the teaching of Walther that it is known to use optical emission spectroscopy (OES) to study the reactions that occur in plasma and to control plasma coatings and etchings, it would have been further obvious to one of ordinary skill to apply such technique for Hunger et al's general teaching of monitoring and control of the plasma, because it supplies a specific means that will accomplish the taught desired goal, and does so with no harmful interactions. It should be further noted that as both Walther and Hunger et al are pulsed plasma process, so they are suitably analogous. In column 2, lines 40-59, note that the maintaining and

control process is occurring multiple times; is concerned with both heating and coating effects; that the measurement and analysis of light pulses of the plasma includes the intensity of at least one emission line of the coating gas, which would suggest or inherently relate to measurement of the amount of one component in the plasma gas of the coating source gas, which in Hunger et al would correspond to a B-containing species. Walther teach that the OES device is connected to the control and analysis unit, which is designed to analyze the emission lines' intensity, which suggests calculation of the amount of the species that emitted it. Note in Fig. 1, the analysis and control unit 6, is also connected to the plasma ignition (5), gas supply valves (7-8), the evacuation system B, hence its use in control is clear for control of plasma parameters these units effect, and further discussion in Walther associates measurement (including emission intensity) with control of plasma conditions through adjusting parameters (column 3, lines 22-49; column 4, lines 5-8; column 5, lines 8-20 & 55-67; column 6, lines 1-15). Walther notes that one of ordinary skill in the art can routinely determine lines to be monitored, depending on the composition of the desired coating (column 3, lines 50-54), which one of ordinary skill would have been expected to apply equally effectively to Hunger et al's suggestion of monitoring and control for the course of the process!

8. Claims 2, 11, 13 and 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hunger et al, in view of Walther (optionally for all but 12) as applied to claims 1-4, 8-13, 15-29 and 40 above, and further in view of Oppel et al as discussed in section 4 of Paper No. 7.

9. Claims 1-13, 15-16, 18-21, 24-26, 28-29 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hou, discussed in section 5 of Paper No. 7, and further in view of Walther (discussed above in section 7).

While Hou's visual determination by noting visible glow discharge is a rough determination of existed gas species amounts, to determine that they are sufficient for deposition (column 7, lines 59-62), Hou et al do not use the determining any way when setting parameters or for control during deposition. However, Walther et al discussed above in section 7, provides an extensive measurement, analysis and control means for pulsed plasmas, analogous to those of Hou, but employing different gases. It would have been a matter of routine engineering skills to apply the plasma monitoring and control technique of Walther to Hou, due to the similarities in types of plasma processes employed. To do so would have been obvious for advantages discussed in Walther, such as correcting sources of error from, for example leaky valves (column 3, line 22+), as well as for the ability to control temperature, which Hou has already noted the need to monitored and control, as well as the effect of plasma parameters thereon, hence the monitoring/control technique of Walther would have been complimentary to the teachings of Hou, enabling better or more complete control of the process.

10. The patent to Kohler et al remains equivalent or cumulative to Walther for showing use of spectroscopy in monitoring plasma processes, but does not provide the details of use and control, as seen in Walther.

11. Applicant's arguments filed May 13, 2003 and discussed above have been fully considered but they are not persuasive.

12. Any inquiry concerning this communication from the examiner should be directed to M. L. Padgett whose telephone number is (703) 308-2336. The examiner can generally be reached on Monday-Friday from about 8:30 a.m. to 4:30 p.m.; and fax phone numbers are (703) 872-9310 (regular); (703) 872-9311 (after final); and (703) 305-6078 (unofficial).

M.L. Padgett/dh 6/20/03 & 7/3/03

/Marianne Padgett/

MARIANNE PADGETT
PRIMARY EXAMINER